The British Sub-Aqua Club

FIRST CLASS DIVER

DIVING KNOWLEDGE EXAM: Sat 1st October 2016 10:30am

Name: _____

Memb No: _____

Please read the following instructions carefully before you begin answering the questions.

- **Answer all 30 questions.** Write your answers in the spaces on the question paper. Please remember to put your name on the paper.
- Brief answers are possible for most questions. Answer as concisely as possible. Use diagrams where these help your answer or where they are asked for.
- There are 2 marks for each question
- You are allowed 15 minutes to read the paper and plan how to answer it.
- You are allowed 60 minutes for writing your answers
- Write all answers in ink, as clearly as possible.
- You may use a calculator but please show all calculations.
- You will need your own copy of the complete BS-AC'88 Tables, levels 1-4 and BSAC Nitrox Tables and BSAC Ox-Stop Tables. No other reference material of any kind is allowed.
- You will need chartwork instruments (i.e. Breton plotter or parallel rules, pencil, compass).
- All questions assume sea water (density 1.025 kg/litre) and the prevailing conditions in the United Kingdom unless otherwise stated.
- Please check your work very carefully. A mistake at an early stage of some questions may result in a series of wrong answers and a loss of marks.

Please note that the mark awarded by the examiners for your performance on this paper is final and under no circumstances can the examiners enter into any correspondence or discussion with you regarding this paper.

MEDICAL

1. A diver surfaces from a 35m dive and complains of a severe migraine that is getting worse. He reports no allergies or medication but didn't sleep well. He completed safety stops. What do you do?

_____

_____

_____

_____

_____

2. List two signs of carbon dioxide poisoning that you might spot in your buddy who is diving on a rebreather.

i)_____

ii) _____

List one things you~~u~~ can do to help your buddy do to resolve the situation?

_____

What is the advantage of an Open Circuit Bailout mouth piece for the rebreather diver in such an emergency?

_____

_____

3. i) What does the Oxygen Toxicity acronym "ConVENTID" stand for in terms of Oxygen toxicity?

_____

_____

_____

ii) What does the acronym "DRABC" stand for in terms of primary casualty assessment?

_____

_____

4) You have a conscious diver who has not been diving but is feeling ill. List four things that you would ask them as part of a secondary assessment to help establish what is wrong.

i) _____

ii) _____

iii) _____

iv) _____

5. What is metabolism?

_____

_____

_____

_____

6. i) Why is it difficult for the human ear to assess direction of sound underwater?

_____

_____

_____

ii) In what circumstances might a diver encounter dangerous levels of sound underwater?

_____

_____

DECOMPRESSION

7. You dive to 42m on 27% for dive time of 33 minutes. You plan to decompress on 50% but on arrival at the stop the regulator fails and you lose your decompression mix. What decompression requirements will you now have according to BSAC tables. Initial tissue code is A/1.

_____

_____

_____

_____

8. List two advantages of conducting accelerated decompression?

i) _____

ii) _____

9. A rebreather diver plans to undertake a 3 hour dive. The set point is 1.3 bar. Assuming no previous dives, what is their CNS and UPTD at the end of the dive. What simple change do you recommend so the plan remains within BSAC recommendations?

CNS% _____

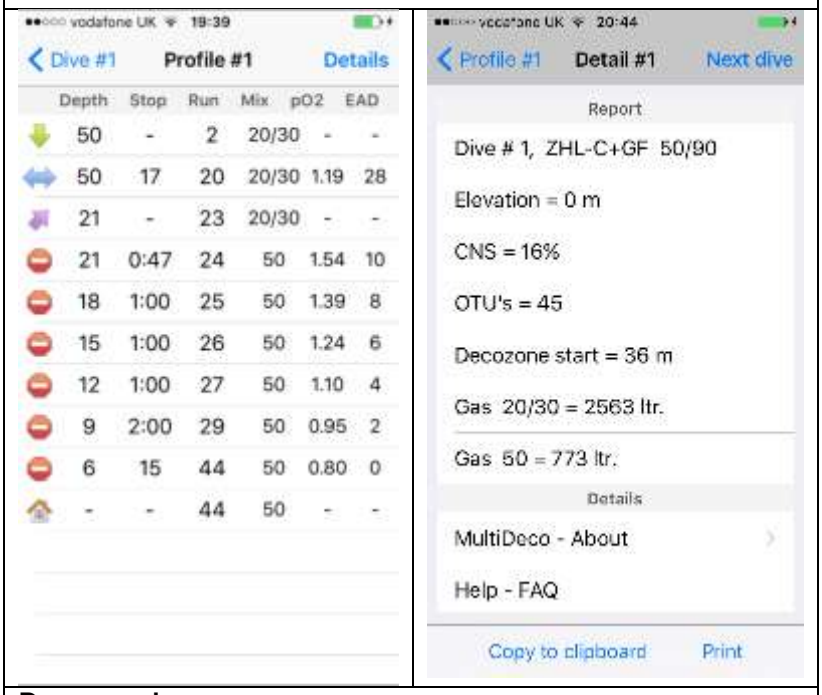
UPTD _____

Change:_____

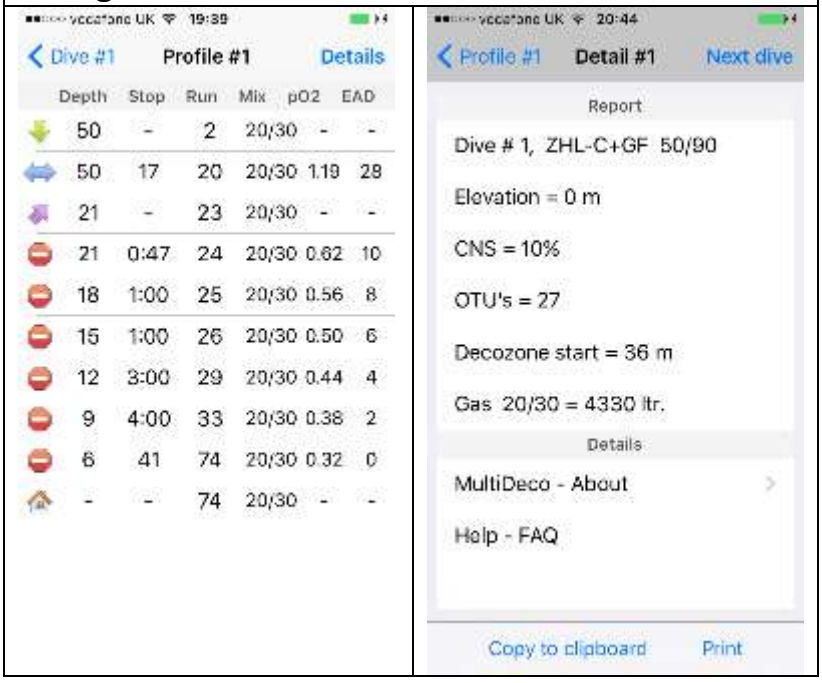
_____

The below images show the output from a decompression algorithm running on a smart phone and form the basis for Questions 10,11 and 12.

Plan



Deco-gas loss



10. What is the Equivalent Air Depth of 20/30 mix at 50m? Is this the same as Equivalent Narcotic Depth? Explain your answer.

_____

_____

11. What size cylinder would you require for bottom gas and decompression gas? Show your workings.

Bottom gas: _____

_____

Decompression Gas: _____

_____

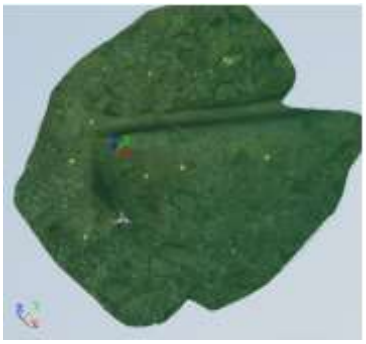
12. What does ZHL-C+GF 50/90 mean for length and location of your decompression stops?

_____

_____

EQUIPMENT

13. What <u>imaging equipment</u> was using to capture the raw data for the following 3D software renderings of a wreck and an anchor.



a) _____ b) _____

_____ _____

14. You have an empty 232 bar cylinder and wish to blend 32%. How much additional oxygen in bar is required if you charge to the full 232 bar assuming ideal gas equations.

Oxygen added (bar) _____

Air Top Off (bar) _____

Show your working.

_____

_____

_____

15. What is a Jon line? Draw a "stick man" diagram showing its use.

16: a) What are the current Periodic Inspection and Test durations for diving cylinders?

Visual: _____ Hydrostatic _____

b) What are the colour coding requirements for air diving cylinders?

_____

_____

_____

_____

17. A rebreather diver encounters a cell error on descent conducts a diluent flush at 30m. Their diluent is 18/35. What partial pressure of oxygen should they see? Show your workings?

_____

18. You are on a diving expedition and your latex wrist seal has broken after the first dive. You have a spare seal. Describe the steps you would take to repair it.

_____

_____

_____

_____

_____

_____

_____

DIVE PLANNING AND TECHNIQUES

19. On open circuit trimix diving in temperate waters, list two implications of loss of decompression gas?

i)_____

ii) _____

List two mitigations to minimise the impact of the gas loss:

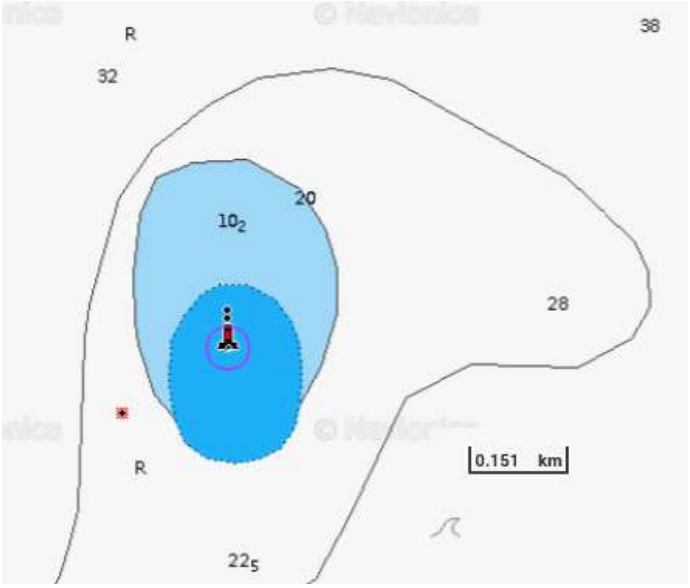
i) _____

_____

ii) _____

_____

20. You are Dive Manager on an offshore pinnacle in the Atlantic from a hard boat. The area is not very well charted. The chart plotter display is shown below. Tidal Atlas indicate up to 0.8 knots from the SE. The isolated danger mark is not present. There is residual swell on the site and a bank of fog has just cleared.



List four safety precautions would you take to ensure safety of boat, crew and divers.

a)_____

b)_____

c)_____

d)_____

21. There are no tidal diamonds near to the pinnacle in Question 20. The closest in open ocean gives the following data.

Hours Before High	Direction	Springs	Neaps
-6	238	0.5	0.2
-5	233	0.7	0.3
-4	232	0.7	0.3
-3	231	0.5	0.2
-2	250	0.3	0.1
-1	308	0.1	0.0
0	37	0.4	0.2
1	56	0.6	1.3
2	57	0.8	0.4
3	57	0.7	0.3
4	63	0.3	0.1
5	238	0.1	0.0
6	239	0.4	0.2

Ullapool Tide Data
Time is UTC + 1
LW 02:45 0.3 m
HW 08:36 5.5 m
LW 15:04 0.5 m
HW 20:51 5.7 m
MHWS: 5.21m
MLWS: 0.76m

What is the maximum tidal range at Ullapool for the day shown?

_____

What is the mean spring tidal range for Ullapool?

_____

What is maximum tidal velocity you would therefore expect and why?

_____

_____

What would be the best relatively slack diving window for the day shown?

_____:_____BST to _____:_____ BST

22. List 4 surface diver detection aids that would be helpful in spotting divers in choppy seas and low light conditions

a) _____

b) _____

c) _____

d) _____

23. A branch member who is a BSAC Sport Diver is an experienced CCR diver and has a MOD 1 with another agency and certified to dive to 40m. His buddy is an Open Circuit a Sports Diver. You plan to conduct a dive to a wreck 15m to the top and 38m to the seabed. List 4 things as the Dive Manager you would check are in place to ensure the pairing is in accordance with safe diving practices.

i)_____

ii) _____

iii)_____

iv) _____

24. A compass rose on a chart states 4°50'W 2011 (11'E). What is the expected variation today? Show your workings.

_____

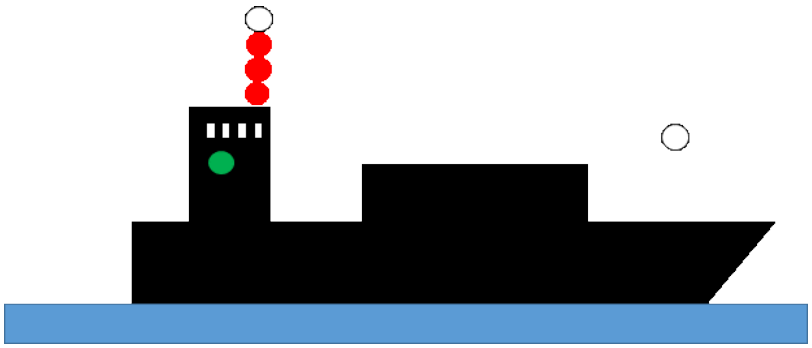
_____

_____

WEATHER AND SEAMANSHIP

25. You wish to maintain a course of due South for the next 2 hours. Your vessel speed is 7.5knots. There is a strong easterly tide of 2knot. What heading do your need to steer to maintain your desired course? Solve graphically or show workings:

26. You are on watch in the wheelhouse of the hard boat during a night passage to the next dive site. You see the following lights off your port side.



How can you tell that you are on a collision course?

_____

_____

Who has right of way and what actions do you take?

_____

_____

_____

27. For the following inshore waters forecast, what do the following terms mean?

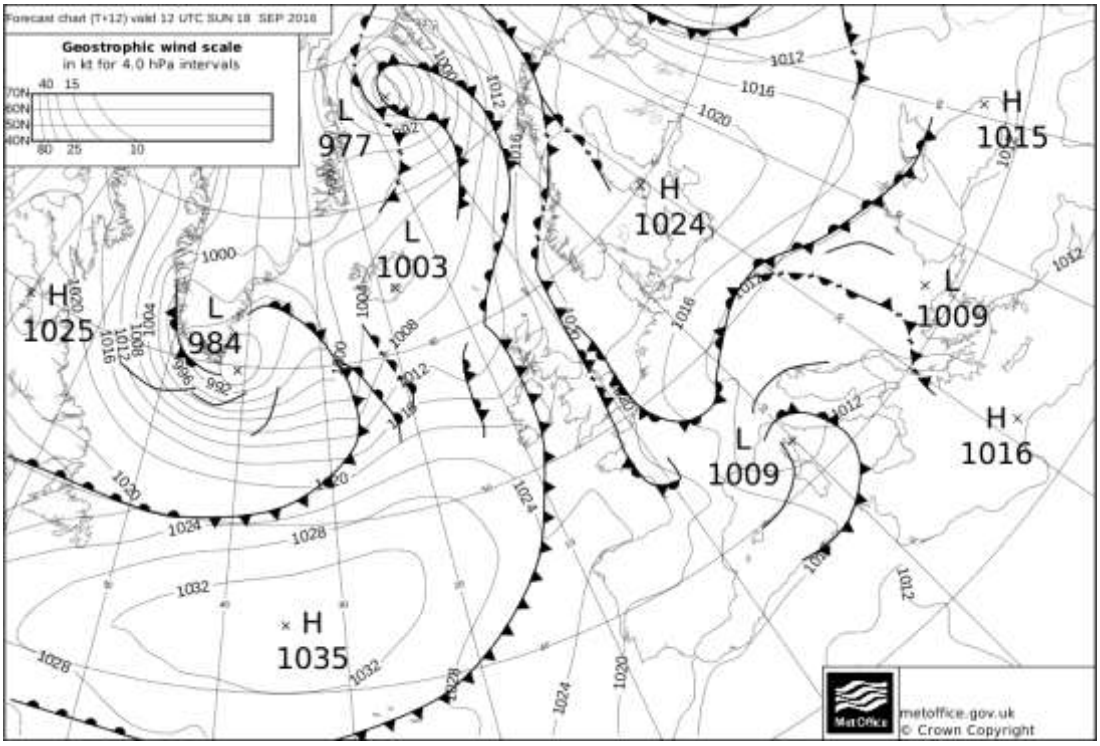
Wind veering: _____

Seastate Moderate: _____

Wind backing: _____

Visibility Good: _____

28. A surface pressure chart is shown below:



What wind and weather would you expect over Scotland?

_____

_____

What surface pressure range would you expect to see?

_____

29. Complete the details of the following navigational buoys.

Type of marker

_____

Direction of danger

_____

Light colour and pattern

_____

Type of marker

_____

Typically used to mark:

_____

_____

Light pattern

_____

30. You are travelling back from a dive in your RHIB and notice a large semi-submerged log the length of your RHIB that constitutes a hazard to navigation to small craft not far off a beach. Conditions are calm. What action are you legally obliged to take under SOLAS V? What practical action could you take instead of or in addition to your legal obligations?

Legal:_____

_____

Practical: _____

_____